and handling possible public health crises. We will discuss, in particular, the responsibilities of individuals, health care professionals and government in maintaining and promoting public health. In this connection, individuals' rights in general and patients' rights in particular will be discussed, and moral issues arising from the allocation of public resources and using biotechnology in public health care will be examined.

LSE 7080 Science, Technology and Environmental Ethics (3,3,0)
This course deals with the ethical dilemma of modern application of science and technology in our pursuit of a better world. Science and technology have greatly enhanced the quality of our lives and our productivity. Yet, they do so at the expense of the environment and other life forms including our future generations. The ethical problem of the effects of science and technology on the environment will be tackled critically from historical, ethical, religious, and individual perspectives.

LSE 7111-2 Dissertation (3,*,*)
This is an optional class for competent students who have determined an appropriate topic through consultation with their chosen faculty advisor. Students will pursue in-depth research on a specific topic in Ethics and Public Affairs. Pertinent themes include those related to any of the three main areas of study—society and culture; ethics and public affairs; science, technology and the environment—as well as topics itemized as relevant areas for independent inquiry which also engage more or less with the above three main areas of studies (e.g. media, education, religion, sports, arts, information and communication technology). The length of the dissertation should be either about 15,000 Chinese characters or about 12,000 English words (not including bibliography and footnotes).

LSE 7120 Critical Thinking for Public Affairs (3,3,0)
To tackle and resolve many issues in ethics and public affairs demands strong analytical power and good skills of critical thinking. This course provides students a basic introduction to critical thinking, with the emphasis on applications to issues in ethics and public affairs. Students in this course are expected to learn the basic skills in logico-linguistic analysis, the detection of fallacies and logical and scientific methods.

LSE 7130 Social Justice (3,3,0)
This course introduces basic concepts of social and political philosophy, including the justification of the state, the nature of social life, the relation between individuals and the collective, the ideas of liberty, right, good, etc. It focuses on major philosophical theories of distributive justice, especially the debates among Rawlsian liberalism, libertarianism and communitarianism. It will also explore the implications of these debates upon various concrete social issues, particularly under the Hong Kong context.

LSE 7140 Law, Liberty and Morality (3,3,0)
The course will address the big question, "What acts may the state rightly make criminal?" We will discuss four liberty-limiting, or coercion-legitimizing, principles in this course even though the famous 19th century philosopher John Stuart Mill argues that the harm-to-others principle is the only legitimate liberty-limiting principle. The other principles that we will discuss are: (1) the offense principle: it is necessary to prevent hurt or offence (as opposed to harm) to others; (2) legal paternalism: it is necessary to prevent harm to the actor herself; and (3) legal moralism: it is necessary to prevent immoral conduct whether or not it harms anyone. Relevant case studies will be conducted for each of these four principles.

LSE 7150 Human Rights in a Multicultural World (3,3,0)
The course will help students reflect on the idea of human rights from the perspectives of major philosophical and religious traditions in the contemporary multicultural world. The contents will cover basic concepts of rights, the historical development of these ideas, and the perspectives of different philosophical traditions (such as liberalism, utilitarianism and communitarianism), and world religions like Confucianism, Buddhism, and Christianity. Finally, the ethical foundation of rights, the balance between individual rights and good society, and conflicts between different kinds of human rights will be discussed.

MATH 1005 Calculus (3,3,1)
Antirequisite: MATH 1006 Advanced Calculus I
This course is intended to introduce general calculus of a single real variable. It will help students without background in calculus to gain the skills for algebraic manipulations for calculus, understand the basic concepts and fundamental theories of differentiation, integration and their applications.

MATH 1006 Advanced Calculus I (3,3,0)
Antirequisite: MATH 1005 Calculus
This course deals with the basic theory of analysis in real-valued functions in single variable. It provides students with a good foundation for more advanced courses in the mathematical science major. Topics include real numbers, sequences, limit and continuity, differentiation, and integration.

MATH 1007 Delicate Mathematics Chemistry (3,3,0)
This course introduces some limitations of deductive procedures in mathematics. Interestingly, this kind of limitations can be found in various fields of mathematics such as geometry, algebra, and even mathematical logic.

MATH 1015 Introductory Statistics with Software (3,3,0)
This course introduces the statistical analysis using computer software. The students will learn how to choose the most appropriate methods for various practical problems. They will use computer to carry out the statistical procedures so that they do not need to memorize the formulae or find the different values by themselves. Only minimal theory behind the statistical methods will be introduced.

MATH 1016 Mathematics Behind Movies and Music (3,3,0)
Movies and music are art forms that are in many ways important to our lives, so is mathematics. Using a relaxed approach, this course illustrates numerous links between the art forms through movie and music clips playing and lectures to let the audience indulge themselves in movie and music appreciation from a different angle. Technical details and advanced proofs are circumvented to let the audience focus on the beautiful mathematical ideas behind the movies and music and to make the materials accessible to science and non-science majors. Mathematical puzzles have often been used in movie plots to symbolize intelligence. The first part of the course introduces some puzzles appeared in movie scenes, such as the water jug problem in Die Hard and the cooperative game in A Beautiful Mind. Mathematical tools and modelling techniques for solving some puzzles are introduced. The second part of the course deals with the application of mathematics in music. Topics include the construction of various tuning systems, the use of group theory to describe variations of a theme, and the use of probability theory to generate melody. To caution the audience, some false patterns in movies and music are demonstrated in the epilogue.

MATH 1017 Mathematics for Personal Financial Management (3,3,0)
This course introduces the mathematics behind different types of financial products of personal financial management with a balanced mix of computation and intuition. Particular attentions will be paid to annuities, such as savings plans and insurance plans, and amortization, such as credit cards, mortgages and car loans. The emphasis is on the formulation of problems mathematically arisen in these financial products. The actual calculations for the solutions will be done with the help of spreadsheet software.

MATH 1205 Discrete Mathematics (3,3,0)
This course integrates the fundamental topics in discrete mathematics and linear system. These topics, including propositional logic, proof methods, set theory, combinatorics, graph algorithms, Boolean algebra, and system of linear equations, are essential for precise processing of information.

MATH 2005 Probability and Statistics for Computer Science (3,3,0)
Antirequisite: MATH 2006 Probability and Statistics for Science and MATH 2206 Probability and Statistics
Prerequisite: MATH 1005 Calculus or MATH 1006 Advanced Calculus I
This course aims to provide an understanding of the basic concepts in probability and statistical analysis, and focuses on applied probability and statistics. Students will learn the fundamental concepts of random variables, the basic concepts and techniques of parameter estimation and hypothesis testing. After taking this course, students will be able to apply the concepts to real-life IT/engineering problems and use popular statistics software to perform analysis.

MATH 2006 Probability and Statistics for Science (3,3,0)
Antirequisite: MATH 2005 Probability and Statistics for Computer Science and MATH 2206 Probability and Statistics
Prerequisite: MATH 1005 Calculus or MATH 1006 Advanced Calculus I
This course aims to provide an understanding of the basic concepts in probability and statistical analysis, and focuses on applied probability and statistics. Students will learn the fundamental concepts of random variables, the basic concepts and techniques of parameter estimation and hypothesis testing. After taking this course, students will be able to apply the concepts and methods to solve different problems in Science and use popular statistics packages to perform analysis.

MATH 2205 Multivariate Calculus (3,3,1)
Prerequisite: MATH 1005 Calculus or MATH 1006 Advanced Calculus I, MATH 2207 Linear Algebra *(recommended)*
This course deals with calculus and functions of several variables. Students should know the basic concepts and technique of univariate calculus. Some knowledge on linear algebra, such as matrix notations and calculations, is preferred. Topics include partial derivative, multiple integral, and their theories and applications.

MATH 2206 Probability and Statistics (3,3,1)
Antirequisite: MATH 2005 Probability and Statistics for Computer Science
This course deals with probability and statistical methods. The emphasis is on what, how, when and why certain probability model and statistical methods can and cannot be applied. Topics include exploratory data analysis, distributions of random variable, estimation, hypothesis testing, analysis of variance, simple linear regression and nonparametric methods. Students are required to solve a variety of problems by using calculators and statistical tables.

MATH 2207 Linear Algebra (3,3,1)
Introduction to linear equations, matrices, determinants, vector spaces and linear transformations, bases, inner products, orthogonality, eigenvalues and eigenvectors, diagonalization, least squares problems and other applications. The course emphasizes matrix and vector calculations and applications.

MATH 2215 Mathematical Analysis (3,3,1)
Prerequisite: MATH 1005 Calculus or MATH 1006 Advanced Calculus I
This course places its main weight on mathematical analysis with using ε–δ argument s an introduction to proofs. It pays special attention to developing the students' ability to read and write proofs. Covered materials include sets and functions, real numbers, open and closed sets, limits of sequences and series, limits and continuity of functions, infinite series, and sequences.

MATH 2216 Statistical Methods and Theory (3,3,1)
Prerequisite: MATH 1005 Calculus or HKDSE Mathematics with Module 1/2, MATH 2207 Linear Algebra or MATH 2205 Multivariate Calculus (*recommended*)
This course deals with the elementary probability theory and the mathematical foundation of some commonly used statistical methods. First the rigorous mathematical frame of the probability theory based upon the concepts of random variables and probability distributions are introduced. The general procedures of statistical inference, such as parameter estimation, hypothesis test, analysis of variance are demonstrated with detailed discussion about their mathematical features. Students are required to comprehend the most commonly used probability distributions and their relations. Central Limit Theorem and related statistical application should be well understood. Several optimal schemes for the estimation accuracy and the hypothesis test power form another important part of the course.

MATH 2217 Advanced Calculus II (3,3,0)
Prerequisite: MATH 1006 Advanced Calculus I
This course deals with the basic theory of analysis in real-valued functions in single variable. It provides students with a good foundation for more advanced courses in the mathematical science major. Topics include integration and series.

MATH 2805 Mathematics of Compound Interest (3,3,0)
Prerequisite: MATH1005 Calculus
To introduce the mathematical theory of interest with application to real financial problems. Students will learn some of the major issue in the field of compound interest.

MATH 3205 Linear and Integer Programming (3,3,0)
Prerequisite: MATH 2207 Linear Algebra
This course aims to introduce students to the fundamental topics in Linear and Integer programming. Students will learn theory, techniques and applications of linear programming and integer programming. Some modeling techniques will be also introduced for linear and integer programming. However, the interior point theory will not be covered.

MATH 3206 Numerical Methods I (3,3,0)
Prerequisite: MATH 1005 Calculus and MATH 2207 Linear Algebra
This introductory course presents students some classical and commonly used numerical methods in various disciplines involving computing and numerical approximation and solution of equations. The course teaches students how to choose an appropriate numerical method for a particular problem and to understand the advantages and limitations of the chosen numerical scheme for a given mathematical problem so that results from the computation can be properly interpreted. The course also highlights important theoretical considerations on convergence and stability for numerical algorithm design.

MATH 3405 Ordinary Differential Equations (3,3,0)
Prerequisite: MATH 2215 Mathematical Analysis or MATH 2217 Advanced Calculus II, MATH 2207 Linear Algebra
This course aims to introduce students to the basic theory of linear ordinary differential equations (ODE) with constant and variable coefficients and the modeling of diverse practical phenomena by ODE. Students will learn both quantitative and qualitative methods for solving these equations. Topics include first and second order scalar ODE, systems of first order ODE, autonomous systems of ODE, existence and uniqueness theorem, Laplac transform for initial value problems, regular and singular Sturm-Liouville boundary value problems and nonlinear differential equations.

MATH 3406 Abstract Algebra (3,3,0)
This course covers some properties of groups, rings and fields. Permutation groups and polynomial rings are included. Application of permutation group on counting and application of finite field on error correcting code are included.

MATH 3407 Advanced Linear Algebra (3,3,0)
Prerequisite: MATH 2207 Linear Algebra
This course is designed for mathematical science major students. General vector space, linear transformations, inner products, diagonal form, Jordan form, dual space and quadratic forms will be introduced. The course emphasizes on general theory of linear algebra.

MATH 3415 Vector Calculus (3,3,0)
Prerequisite: MATH 2205 Multivariate Calculus and MATH 2207 Linear Algebra
This course is designed to develop the intuitive understanding, theory, and computational skills necessary for the concepts of vector functions by tying together multivariate calculus with concepts of vector. Topics covered include Vector Fields, Stokes theorem, Green's theorem, Gauss' theorem, and their applications.

MATH 3416 Complex Analysis (3,3,0)
Prerequisite: MATH 2215 Mathematical Analysis or MATH 2217 Advanced Calculus II
This course provides an up-to-date introduction to the basic theory of analytic functions of one complex variable. Residue Theorem and its applications to the evaluation of integrals and sums will be one of the main objectives. Also conformal mappings and their applications will be discussed.

MATH 3417 Game Theory (3,3,0)
The purpose of this class is to provide an introduction to game modeling and theory. In studying of strategic behavior among parties having apposed, mixed or similar interests, students will be able to think strategically, understand and explain a wide range of problems. Students will learn how to recognize and model strategic situations, to predict when and how your actions will influence the decisions of others and to exploit strategic situations for your own benefit. It is also important to emphases that game theory is a deductive, mathematical enterprise; therefore, it requires abstract, symbolic reasoning. The major topics covered are strategic games, extensive games with perfect and imperfect information, and coalitional games.

MATH 3425 Graph Theory (3,3,0)
This course covers some fundamental concepts and principles of graph theory. Some algorithms of graphs are also discussed. Students will learn some techniques to solve some graph problems.

MATH 3426 Number Theory (3,3,0)
This course provides an introduction to the theory of numbers. Basic concept such as divisibility, congruence, diophantine equations will be covered. Some applications such as cryptography will be introduced.

MATH 3427 Real Analysis (3,3,0)
Prerequisite: MATH 2215 Mathematical Analysis or MATH 2217 Advanced Calculus II
This course provides an introduction to measure theory, Lebesgue integration, L^p spaces, and Fourier analysis. Equipped with this knowledge, students are prepared for further studies in numerical analysis, functional analysis and advanced probability theory.

MATH 3495 Job Practicum I (1,0,0)
Prerequisite: Year 2 or Year 3 students. Students must receive permission from the internship coordinator in advance.
The course aims to enhance students' competitiveness for future employment, and to build a channel through which they can reach their potential employers. Students will work in an organization or a company as interns and complete work assignment that are primarily related to their major study.

MATH 3496 Job Practicum II (1,0,0)
Prerequisite: Year 2 or Year 3 students. Students must have taken or must be concurrently taking MATH 3495 Job Practicum I. Students must receive permission from the internship coordinator in advance.
The course aims to enhance students' competitiveness for future employment, and to build a channel through which they can reach their potential employers. Students will work in an organization or a company as interns and complete work assignment that are primarily related to their major study.

MATH 3497 Job Practicum III (1,0,0)
Prerequisite: Year 2 or Year 3 students. Students must have taken MATH 3495 Job Practicum I, and must have taken or be concurrently taking MATH 3496 Job Practicum II. Students must receive permission from the internship coordinator in advance.
The course aims to enhance students' competitiveness for future employment, and to build a channel through which they can reach their potential employers. Students will work in an organization or a company as interns and complete work assignment that are primarily related to their major study.

MATH 3605 Numerical Methods II (3,3,0)
Prerequisite: MATH 3206 Numerical Methods I, MATH 3405 Ordinary Differential Equations
This is the continuation of the Numerical Methods I. The course covers the concepts of Discrete/Fast Fourier Transform (DFT/FFT), the concepts of optimization, numerical methods for solution of systems of nonlinear equations, numerical methods for optimization and algorithms for solutions of initial value problems and boundary value problems for ordinary differential equation. The constructions of the algorithms and their advantages and limitations will be discussed so that the results of the computations can be properly interpreted.

MATH 3606 Partial Differential Equations (3,3,0)
Prerequisite: MATH 2205 Multivariate Calculus, MATH 3405 Ordinary Differential Equations
This course introduces the theory of multi-dimensional scalar and system of parabolic, elliptic and hyperbolic partial differential equations (PDEs) that model physical processes in areas such as physics, biology, chemistry and social science. Solution techniques such as the separation of variables, eigenfunction expansions, Green functions, Fourier and Laplace transforms for solving the equations in a bounded and unbounded domain, with homogeneous and inhomogeneous source term will be studied in detail. Some classical numerical methods such as finite difference schemes and finite elements schemes for solving partial differential equations will also be introduced.

MATH 3615 Introduction to Imaging Science (3,3,0)
Prerequisite: MATH 1005 Calculus or MATH 1006 Advanced Calculus I
This course aims to introduce students to the foundation of digital image analysis. Students will learn elementary point operation techniques for image enhancement, and advanced techniques (including the theory of Fourier transform) for image restoration and image analysis. Students will come to understand all the major issues involved in the design and implementation of a digital imaging system.

MATH 3616 Numerical Methods for Differential Equations (3,3,0)
Prerequisite: MATH 3606 Partial Differential Equations and MATH 3206 Numerical Methods I or MATH 3605 Numerical Methods II (*recommended*)
This course introduces the major numerical techniques for solving partial differential equations. Emphasis is placed on finite difference methods and finite element methods. Some typical engineering problems, such as shock waves, are analysed.

MATH 3625 Advanced Numerical Analysis (3,3,0)
Prerequisite: MATH 3206 Numerical Methods I
This course provides a theoretical understanding of the major ideas of numerical analysis. Emphasis is placed on the study of underlying principles, error bounds, convergence theorems, etc. in the area of numerical analysis.

MATH 3805 Regression Analysis (3,3,0)
Prerequisite: MATH 2207 Linear Algebra, and one of the following: (i) MATH 2005 Probability and Statistics for Computer Science; (ii) MATH 2006 Probability and Statistics for Science; (iii) MATH 2206 Probability and Statistics; or (iv) MATH 2216 Statistical Methods and Theory
This course aims to provide an understanding of the classical and modern regression analysis and techniques which are widely adopted in various areas such as business, finance, biology, and medicine. There have been great developments in the past decades such as nonlinear regression, robust regression, nonparametric and regression. With the help of a statistical package such as SAS, Matlab or R, students can analyse multivariate data by modern regression techniques without any difficulty.

MATH 3806 Multivariate Statistical Methods (3,3,0)
Prerequisite: MATH 2206 Probability and Statistics or equivalent, MATH 2207 Linear Algebra
To provide an understanding of the classical multivariate analysis. Very often, observations in the social, life and natural sciences are multidimensional or very high dimensional. This kind of data sets can be analysed by techniques in multivariate analysis. With the help of statistical package, such as Matlab and R, students will learn how to treat real multivariate problems.

MATH 3807 Simulation (3,2,1)
This course aims to introduce basic technique in computer simulation. Two computer software packages (one for continuous systems and one for discrete systems) will be taught. Various practical problems will be modelled, discussed, and simulated through computer simulation. Upon completion of this course, students should be able to simulate a wide range of practical problems in the daily life.

MATH 3815 Statistical Design and Analysis of Experiments (3,3,0)
Prerequisite: MATH 3805 Regression Analysis
To provide an understanding of various kinds of experimental designs involving factorial and uniform designs. The experimental design has a long history and has been widely used in industry, agriculture, quality control, natural sciences, computer experiments and even survey design. They are useful in business and social sciences. The statistical software will be used to support the lecture.

MATH 3816 Statistical Analysis of Sample Surveys (3,3,0)
Prerequisite: MATH 2206 Probability and Statistics or equivalent
To provide students with a good understanding of survey operations, survey sampling methods and the corresponding analyses of data. Important points in questionnaire design will also be addressed in the course. Students will form teams to do course projects. On completion of the course, students should be able to design, carryout, and write reports based on a professional survey.

MATH 3817 Dynamic Programming and Inventory Models (3,3,0)
Prerequisite: MATH 2207 Linear Algebra, MATH 2206 Probability and Statistics, MATH 3205 Linear and Integer Programming
This course introduces basic principles, classical models, popular algorithms and various applications in other fields of inventory management and dynamic programming.

MATH 3825 Life Insurance and Life Contingencies (3,3,0)
Prerequisite: MATH 2206 Probability and Statistics or equivalent
To introduce the theory of life insurance and life contingencies with application to insurance problems. Students will learn some of the major issue in the field of actuaries.

MATH 3826 Markov Chain and Queuing Theory (3,3,0)
Prerequisite: MATH 2207 Linear Algebra, MATH 2206 Probability and Statistics, MATH 3205 Linear and Integer Programming
This course introduces basic principles, classical models, popular algorithms and various applications in other fields of Queuing Theory and Markov Chain.

MATH 3827 Network Models (3,3,0)
Prerequisite: MATH 2207 Linear Algebra, MATH 3205 Linear and Integer Programming
This course aims to introduce basic principles, classical models, popular algorithms and various applications in other fields of network programming.

MATH 3836 Data Mining (3,3,0)
This course introduces the concept of data mining and data mining techniques (including advanced statistical and machine learning techniques) for solving problems such as data cleaning, clustering, classification, relation detection, forecasting.

MATH 3837 Actuarial Mathematics (3,3,0)
Prerequisite: MATH 2206 Probability and Statistics, MATH 2805 Mathematics of Compound Interest
To introduce the theory of life insurance and life contingencies with applicaion to insurance problems. Students will learn some of the major issue in the field of actuaries.

MATH 4205 Topics in Probability Theory and Stochastic Processes (3,3,0)
Prerequisite: MATH 2205 Multivariate Calculus, MATH 2206 Probability and Statistics
This course introduces topics from conditional expectations, Markov chains, Markov processes, Brownian motion, and martingales, and their applications to stochastic calculus.

MATH 4206 Financial Derivatives (3,3,0)
Prerequisite: MATH 2205 Multivariate Calculus, MATH 2206 Probability and Statistics
This course introduces computational methods for problems of finance, including mainly the computation of market indicators and option price.

MATH 4207 Computational Finance (3,3,0)
Prerequisite: MATH 2205 Multivariate Calculus, MATH 2206 Probability and Statistics
This course introduces basic numerical methods, numerical solutions of PDEs and probabilistic methods.

MATH 4216 Mathematical Finance (3,3,0)
Prerequisite: MATH 2205 Multivariate Calculus, MATH 2206 Probability and Statistics
This course introduces topics from replication of trading strategies, arbitrage, completeness, martingale representation theorem, fundamental theorem of finance, stochastic differential equations, and Black-Scholes formula of option pricing.

MATH 4406 Differential Geometry (3,3,0)
Prerequisite: MATH 2205 Multivariate Calculus and MATH 2207 Linear Algebra or MATH 3405 Ordinary Differential Equations (*recommended*)
This course teaches students the mathematical tools of classical differential geometry. Applications to curve and surface designs are also given.

MATH 4416 Combinatorics (3,3,0)
Prerequisite: MATH 3406 Abstract Algebra (*recommended*)
This is an advance level enumerative combinatorics course. This course introduces a systematic coverage of enumeration of configurations with specified properties. Some combinatorics objects and some advanced techniques for counting, such as recurrence relation, generating function, Burnside's theorem, cyclic index and Pólya's theorem, will be introduced.

MATH 4417 Topology (3,3,0)
Prerequisite: MATH 2215 Mathematical Analysis or MATH 2217 Advanced Calculus II
This course covers the essential concepts of topological spaces. Important topological properties are also taught to lay the ground work for further studies.

MATH 4465 Special Topics in Mathematics I (3,3,0)
MATH 4466 Special Topics in Mathematics II (3,3,0)
MATH 4467 Special Topics in Mathematics III (3,3,0)
This course is devoted to the study of up-to-dated and important topics in different areas of mathematics. Emphasis is laid on the continuation and consolidation of those fundamental courses offered in the programme. It is specifically designed with the flexibility to take advantage of visiting scholars from other institutions to introduce topics that are under current research.

MATH 4606 Functional Analysis (3,3,0)
Prerequisite: MATH 2207 Linear Algebra, MATH 2215 Mathematical Analysis or MATH 2217 Advanced Calculus II, or consent of instructor
This course aims at familiarizing the student with the basic concepts, principles and methods of functional analysis and its applications. Functional analysis plays an important role in the applied sciences as well as in mathematics itself. Roughly speaking, functional analysis develops the tools from calculus and linear algebra further to the more general setting where one has vector spaces comprising functions or general abstract infinite-dimensional vector spaces. Problems from various application areas can then be conveniently posed in this common general set up, and solved using the techniques of functional analysis. The basic objects studied in functional analysis are vector spaces with a notion of distance between vectors, and continuous maps between such vector spaces. This interplay between the algebraic and analytic setting gives rise to many interesting and useful results, which have a wide range of applicability to diverse mathematical problems, such as from numerical analysis, differential and integral equations, optimization and approximation theory.

MATH 4615 Introduction to Numerical Linear Algebra (3,3,0)
Prerequisite: MATH 2207 Linear Algebra, MATH 3206 Numerical Methods I
This course aims to provide a thorough discussion of the advanced topics and state of art development in numerical linear algebra. This course emphasizes on both the theoretical analysis and the computer applications of numerical linear algebra in various areas.

MATH 4665 Special Topics in Applied Mathematics I (3,3,0)
MATH 4666 Special Topics in Applied Mathematics II (3,3,0)
MATH 4667 Special Topics in Applied Mathematics III (3,3,0)
This course is devoted to the study of up-to-date and important topics in different areas of applied mathematics. Emphasis is laid on the continuation and consolidation of those fundamental applied courses offered in the programme. It is specifically designed with the flexibility to take advantage of visiting scholars from other institutions to introduce topics that are under current research.

MATH 4805 Applied Nonparametric Statistics (3,3,0)
Prerequisite: MATH 2216 Statistical Methods and Theory
The course aims at introducing some efficient nonparametric statistical methods to students and let them know how to use those methods in practice. Corresponding programming techniques to facilitate these practices will also be introduced within the platforms of MATLAB. Case studies will be provided to make the students acquainted with the elementary techniques.

MATH 4807 Categorical Data Analysis (3,3,0)
Prerequisite: MATH 3805 Regression Analysis
To equip students with statistical methods for analyzing categorical data arisen from qualitative response variables which cannot be handled by methods dealing with quantitative response, such as regression and ANOVA. Some computing software, such as SAS, S-PLUS, R or MATLAB, will be used to implement the methods.

MATH 4815 Interior Point Methods for Optimization (3,3,0)
Prerequisite: MATH 3205 Linear and Integer Programming
This course aims to introduce students to the fundamental topics in the interior point based methods for optimization, both the discrete and continuous versions of the interior point methods will be taught. Students will learn theory, techniques and solution schemes of the interior point based methods for linear programming, quadratic programming, convex programming, and semi-definite programming problems. Some Mathlab implementation will be also addressed.

MATH 4816 Optimization Theory and Techniques (3,3,0)
Prerequisite: MATH 2207 Linear Algebra, MATH 2215 Mathematical Analysis or MATH 2217 Advanced Calculus II
This course aims to (a) provide the fundamental theory and techniques in unconstrained and constrained optimization, (b) introduce some existing numerical software packages, and (c) offer some interdisciplinary techniques and applications related to optimization.

MATH 4817 Stochastic Models (3,3,0)
Prerequisite: MATH 2216 Statistical Methods and Theory
To introduce the theory of stochastic processes with their application, and to develop and analyse probability models that capture the salient features of the system under study to predict the short and long term effects that this randomness will have on the systems under consideration.

MATH 4825 Survival Analysis (3,3,0)
Prerequisite: MATH 3805 Regression Analysis
This course aims to provide students with a good understanding of techniques for the analysis of survival data, including methods for estimating survival probabilities, comparing survival probabilities across two or more groups, and assessing the effect of covariates on survival. The emphasis will be on practical skills for data analysis using statistical software packages. Students will form groups to do projects involving the analysis of real data.

MATH 4826 Time Series and Forecasting (3,3,0)
Prerequisite: MATH 3805 Regression Analysis
The course aims at providing students with an understanding of the statistical methods for time series data whose order of observation is crucially important in depicting the background dynamics of the related social, economical, and/or scientific phenomena. The students will learn to use various time series models and techniques such as exponential smoothing, ARIMA, etc., to model and make forecasts. Corresponding programming techniques to facilitate these practices will also be introduced within the platforms of MATLAB. Case studies will be provided to make the students acquainted with the elementary techniques.

MATH 4827 Actuarial Mathematics II (3,3,0)
Prerequisite: MATH 2805 Mathematics of Compound Interest and Math 3837 Actuarial Mathematics
Actuarial reserves: allocation of the loss to the policy years. Multiple life functions: joint-life, last-survivor. Multiple decrement models: stochastic and deterministic approaches, associated single decrement, fractional durations. Valuation theory for pension plans. Insurance models including expenses: gross premiums and reserves, type of expenses, modified reserves. Non-forfeiture benefits and dividends: equity concept, cash values insurance options, asset shares, dividends.

MATH 4835 Property and Casualty Insurance (3,3,0)
Prerequisite: MATH 2805 Mathematics of Compound Interest and Math 3837 Actuarial Mathematics
Ratemaking: terminology, process, trend, ultimate losses, expense provisions, profit and contingencies, overall rate indications, classification rates, increased limits. Individual risk rating: prospective systems, retrospective rating, design. Loss Reserving: accounting concepts, definitions, principles, loss reserving process. Risk classification: relationship to other mechanisms, criteria for selecting rating variables, examples, efficiency, estimating class relativities.

MATH 4836 Theory of Pension (3,3,0)
Prerequisite: MATH 2805 Mathematics of Compound Interest and Math 3837 Actuarial Mathematics
Overview of pension plans: design, funding, regulation, accounting standards. Pension funding methods: actuarial cost methods, terminal funding method. Individual actuarial cost methods: accrual benefit cost method, entry-age actuarial cost method, unit-credit method, individual-level-premium method, attainted-age-normal method. Group actuarial cost methods.

MATH 4837 Risk and Portfolio Management (3,3,0)
Prerequisite: MATH 2205 Multivariate Calculus and MATH 2206 Probability and Statistics
This course introduces the fundamental concepts of financial derivatives and portfolio risk measurement and management. Students will learn why both firms and individual investors should learn how to measure and manage risk. The first part of the course overviews on some common financial derivative instruments and their natures, how they can be used for investment and hedging purposes, and how they can be priced. The second part of the course gives the students an insight into how a business can identify the risk components, measure its loss exposures and select appropriate tools for the management risks. We shall detail the types of risks that firms are exposed to, and the costs and benefits associated with risk management. We examine the popular Value-at-Risk (VAR) and Expected Shortfall (ES) framework to help us estimate the risk exposure of firms. The third part of the course discusses about the portfolio measurement, management and portfolio performance evaluation. To highlight the practical relevance of the course materials we shall discuss a number of real-word case studies throughout the course.

MATH 4865 Special Topics in Operations Research I (3,3,0)
MATH 4866 Special Topics in Operations Research II (3,3,0)
MATH 4867 Special Topics in Operations Research III (3,3,0)
This course is devoted to the study of up-to-date and important topics in different areas of Operations Research. Emphasis is laid on the continuation and consolidation of those fundamental courses offered in the programme. It is specifically designed with the flexibility to take advantage of visiting scholars from other institutions to introduce topics that are under current research.

MATH 4875 Special Topics in Statistics I (3,3,0)
MATH 4876 Special Topics in Statistics II (3,3,0)
MATH 4877 Special Topics in Statistics III (3,3,0)
This course is devoted to the study of up-to-date and important topics in different areas of Statistics. Emphasis is laid on the continuation and consolidation of those fundamental applied courses offered in the programme. It is specifically designed with the flexibility to take advantage of visiting scholars from other institutions to introduce topics that are under current research.

MATH 4998 Mathematical Science Project I (3,0,9)
Prerequisite: Year IV Standing
This is a half-year individual project which usually relates to an interdisciplinary or applied topic, and requires knowledge and skill acquired in various courses. A thesis and an oral presentation are required upon completion of the project.

MATH 4999 Mathematical Science Project II (3,0,9)
Prerequisite: MATH 4998 Mathematical Science Project I, and Recommendation by the supervisor
This is an extension of MATH 4408 for outstanding students, who are now supposed to conduct more innovative further developments for their results obtained in MATH 4408. A thesis and an oral presentation for Project I are waived but will be required upon completion of Project II.

MATH 7030 Numerical Linear Algebra (3,3,0)
This course covers the advanced topics in numerical linear algebra. Theoretical issues as well as practical computer applications will be addressed.

MATH 7050 Optimization Theory and Techniques (3,3,0)
This course introduces the fundamental theory and techniques for both unconstrained and constrained optimization. Overview of the existing numerical software packages will be addressed. Finally some interdisciplinary techniques and applications related to optimization will be discussed.

MATH 7140 Special Topics in Applied Mathematics I (3,3,0)
This course is devoted to the study of up-to-date and important topics in different areas of applied mathematics. Emphasis is laid on the continuation and consolidation of those fundamental courses offered in the programme. It is specifically designed with the flexibility to take advantage of visiting scholars from other institutions to introduce topics that are under current research.

MATH 7150 Special Topics in Applied Mathematics II (3,3,0)
This course is devoted to the study of up-to-date and important topics in different areas of applied mathematics. Emphasis is laid on the continuation and consolidation of those fundamental courses offered in the programme. It is specifically designed with the flexibility to take advantage of visiting scholars from other institutions to introduce topics that are under current research.

MATH 7160 Special Topics in Applied Mathematics III (3,3,0)
This course is devoted to the study of up-to-date and important topics in different areas of applied mathematics. Emphasis is laid on the continuation and consolidation of those fundamental courses offered in the programme. It is specifically designed with the flexibility to take advantage of visiting scholars from other institutions to introduce topics that are under current research.

MATH 7170 Interior Point Methods for Optimization (3,3,0)
This course aims to introduce students to the fundamental topics in the interior point based methods for optimization, both the discrete and continuous versions of the interior point methods will be taught. Students will learn theory, techniques and solution schemes of the interior point based methods for linear programming, quadratic programming, convex programming, and semidefinite programming problems. Some MATLAB implementation will be also addressed.

MATH 7190 Applied Nonparametric Statistics (3,3,0)
The course aims at introducing some efficient nonparametric statistical methods to students and let them know how to use those methods in practice. Corresponding programming techniques to facilitate these practices will also be introduced within the platforms of MATLAB. Case studies will be provided to make the students acquainted with the elementary techniques.

MATH 7200 Survival Analysis (3,3,0)
This course aims to provide students with a good understanding of techniques for the analysis of survival data, including methods for estimating survival probabilities, comparing survival probabilities across two or more groups, and assessing the effect of covariates on survival. The emphasis will be on practical skills for data analysis using statistical software packages. Students will form groups to do projects involving the analysis of real data.

MATH 7240 Special Topics in Mathematics I (3,3,0)
This course is devoted to the study of up-to-date and important topics in different areas of mathematics. Emphasis is laid on the continuation and consolidation of those fundamental courses offered in the programme. It is specifically designed with the flexibility to take advantage of visiting scholars from other institutions to introduce topics that are under current research.

MATH 7250 Special Topics in Mathematics II (3,3,0)
This course is devoted to the study of up-to-date and important topics in different areas of mathematics. Emphasis is laid on the continuation and consolidation of those fundamental courses offered in the programme. It is specifically designed with the flexibility to take advantage of visiting scholars from other institutions to introduce topics that are under current research.

MATH 7260 Special Topics in Mathematics III (3,3,0)
This course is devoted to the study of up-to-date and important topics in different areas of mathematics. Emphasis is laid on the continuation and consolidation of those fundamental courses offered in the programme. It is specifically designed with the flexibility to take advantage of visiting scholars from other institutions to introduce topics that are under current research.

MATH 7270 Special Topics in Operations Research I (3,3,0)
This course is devoted to the study of up-to-date and important topics in different areas of Operations Research. Emphasis is laid on the continuation and consolidation of those fundamental courses offered in the programme. It is specifically designed with the flexibility to take advantage of visiting scholars from other institutions to introduce topics that are under current research.

MATH 7280 Special Topics in Operations Research II (3,3,0)
This course is devoted to the study of up-to-date and important topics in different areas of Operations Research. Emphasis is laid on the continuation and consolidation of those fundamental courses offered in the programme. It is specifically designed with the flexibility to take advantage of visiting scholars from other institutions to introduce topics that are under current research.

MATH 7290 Special Topics in Operations Research III (3,3,0)
This course is devoted to the study of up-to-date and important topics in different areas of Operations Research. Emphasis is laid on the continuation and consolidation of those fundamental courses offered in the programme. It is specifically designed with the flexibility to take advantage of visiting scholars from other institutions to introduce topics that are under current research.

MATH 7300 Special Topics in Statistics I (3,3,0)
This course is devoted to the study of up-to-date and important topics in different areas of statistics. Emphasis is laid on the continuation and consolidation of those fundamental courses offered in the programme. It is specifically designed with the flexibility to take advantage of visiting scholars from other institutions to introduce topics that are under current research.

MATH 7310 Special Topics in Statistics II (3,3,0)
This course is devoted to the study of up-to-date and important topics in different areas of statistics. Emphasis is laid on the continuation and consolidation of those fundamental courses offered in the programme. It is specifically designed with the flexibility to take advantage of visiting scholars from other institutions to introduce topics that are under current research.

MATH 7320 Special Topics in Statistics III (3,3,0)
This course is devoted to the study of up-to-date and important topics in different areas of statistics. Emphasis is laid on the continuation and consolidation of those fundamental courses offered in the programme. It is specifically designed with the flexibility to take advantage of visiting scholars from other institutions to introduce topics that are under current research.

MCCP Mandatory Common Core Programme for Research Postgraduate Students (3,*,*)
Research postgraduate students are required to complete a mandatory common core programme (MCCP) before confirmation of candidature. The programme aims to equip students with the necessary skills and knowledge to better prepare themselves for their academic career at HKBU and beyond. The MCCP comprises two credit-bearing courses, namely, MCCP 7010 and 7020. Others are still mandatory yet non-credit bearing, including MCCP 7030, 7040, 7060, 7090, 7100, 7110 and 7120. For details, please refer to the Graduate School website (http://gs.hkbu.edu.hk/en/current/rpg/coursework_enrol/).

MCCP 7010 Teaching University Students (1,2,0)
The course aims to prepare research postgraduate students to undertake a role in teaching undergraduate students. It provides an introduction to the basic theoretical knowledge and practical skills required to begin teaching at university.

MCCP 7020 Advanced English for Academic Purposes (2,4,0)
This course is a compulsory course offered to all research postgraduate students at HKBU and it has two principal components. The first component aims: (1) to develop postgraduates' competence in presenting their research ideas effectively and (2) to equip them with the skills to answer questions appropriately in seminar/conference presentations and oral defences. The second component focuses on: (1) the language, features and format of the various stages of a thesis, (2) the development of a scholarly voice through style and tone, (3) the importance of accuracy in academic writing and (4) strategies to avoid plagiarism when referring to the ideas of others or incorporating extant literature into original research.

MCCP 7030 Online Tutorial on Academic Integrity (0,*,0)
Using pertinent cases as examples, the six modules in the Academic Integrity Online Tutorial (AIOT) provide information about academic integrity and how to demonstrate it. Each module explores what it means to plagiarize with interesting illustrations and a self-test allowing you to gauge students' understanding of the topics. In addition, the Tutorial provides strategies that can be applied to avoid committing academic dishonesty.

MCCP 7040 Research Support Skills: Introduction to Scholarly Communication (0,*,0)
Academics need to be aware of how their research findings will be disseminated to and evaluated by the wider scholarly community. In this session, new research postgraduates will learn about current trends in this area, with a particularly focus on the open access movement. Additionally, quantitative measures of academic impact (e.g. citation counts and journal rankings) as well as the emerging importance of "altmetrics" will be discussed.